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EXTRACT *from a* PAPER *on* SURVEYING. *By* THOMAS MEAGHER, *near Palace Grene in the County of Limerick.*

On a new Diviſion of the Compaſs for Land Surveying.

THE preſent diviſion of the compaſs into degrees, &c. originally intended for the convenience of the navigator, is not neceſſary for the land ſurveyor. To him a diviſion which would give by inſpection the ſine and coſine of the angle meaſured would be of much greater importance. Such a diviſion would preclude the neceſſity of having recourſe to a table of natural ſines, and very often give the ſine or coſine accurately in only two or three places of figures, which would be of conſiderable uſe in facilitating the computation of great ſurveys. This diviſion might be accompliſhed with the ſame eaſe to the inſtrument-maker as the preſent one, and would in every caſe afford equal if not greater accuracy in the reſult.

LET the periphery of the circle be divided into forty parts, or the quadrant into ten, and each of theſe again into ten parts, in ſuch a manner that the ſines anſwering to the extremity of each diviſion may be ,01 ,02 ,03 ,04 ,05 ,06, ,07 ,08 ,09 ,1,11, &c. radius being unity. Let alſo the periphery be divided in the ſame manner in a contrary direction. The principal diviſions may be numbered 1, 2, 3, 4, &c. but the ſub-diviſions need not be numbered, leſt the numbers ſhould be confuſed. If the magnitude of the inſtrument admits it, each of theſe ſubdiviſions may be again ſubdivided by the eye into 5. Every compaſs uſed in ſurveying ought to be large enough to admit this, otherwiſe the neceſſary accuracy could not be attained, whether it be divided by the old method or by the one now propoſed.

HENCE it is evident that by inſpection we can have the ſine and coſine of the bearing pointed out by the needle to three places of figures, and near the end of the quadrant even to four, which will in every caſe give the area with as much or greater accuracy as the method by the common compaſs. It may be objected that the ſubdiviſions to be performed or computed by the eye ought not to be equal; but, although they are not accurately ſo, yet they are ſo nearly equal, that no error will ariſe except for the ſines of arches near the end of the quadrant. Theſe ſubdiviſions, as they include large arches, may be accurately ſubdivided with great eaſe by the inſtrument-maker; or inſtead of ſubdividing theſe a ſmall table may be uſed for finding the ſines of large or coſines of ſmall arches; the tabular number to be entered with

with the coſine of the large, or ſine of the ſmall arch. The ſubdiviſion between ,94 and ,95 includes 1° 44′, and therefore from this to the end of the quadrant it will be better to have the ſubdiviſions accurately marked by the inſtrument-maker, or perhaps better ſtill to have a ſmall table for this part.

THE annexed figure ſhews the diviſion propoſed; but only one of the principal diviſions is ſubdivided. The outer or upper edge of the ring is to be divided in one direction, and the inner edge in the contrary one.

A CONSIDERABLE advantage ariſes in this method of dividing the compaſs from the check which the two readings afford.